

- (1) mixing aqueous solutions or dispersions of organic polymers, polymer precursors, or mixtures thereof which are capable of forming polymer networks in the aqueous phase with silicon dioxide compounds,
 - (2) changing the pH of and/or thermally treating the aqueous solution or dispersion to form a gel consisting of interpenetrating organic and silica gel networks, and
 - (3) drying the gel;
- (b) producing materials using the gel, the materials comprising thermal insulation properties, sound absorption properties, adsorption properties, and/or barrier properties against water and/or organic solvent.

Claim 21. The process of claim 20 in which the gel is dried under conditions which lead to a composite material.

Claim 22. The process of claim 21 in which the produced materials are granulates or molded ceramic articles.

Claim 23. The process of claim 20 in which the gel is dried under conditions which lead to a xerogel or an aerogel.

Claim 24. The process of claim 23 in which the produced materials comprise molded articles or surface coatings.

Claim 25. A process of using materials for medical diagnostics and sensor technology, the process comprising:

- (a) providing organic and inorganic networks which interpenetrate on a scale of no more than 100 nm, the organic and inorganic networks which interpenetrate on a scale of no more than 100 nm produced by a method comprising:

- (1) mixing aqueous solutions or dispersions of organic polymers, polymer precursors, or mixtures thereof which are capable of forming polymer networks in the aqueous phase with silicon dioxide compounds,
 - (2) changing the pH of and/or thermally treating the aqueous solution or dispersion to form a gel consisting of interpenetrating organic and silica gel networks, and
 - (3) drying the gel;
- (b) producing materials comprising the gel in conjunction with dyes, indicators, receptors, enzymes and/or biomolecules; and
- (c) using the materials for medical diagnostics and sensor technology.

Claim 26. The process of claim 25 in which the materials have a density of no more than 0.6 g/cm³.

Claim 27. The process of claim 25 in which the materials comprise a molded article or surface coating.

Claim 28. The process of claim 27 in which the materials have a density of no more than 0.6 g/cm³.

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